Lack of concordance between ECDC and CDC systems for surveillance of ventilator associated pneumonia

Intensive Care Medicine

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Author Comments:	Each surveillance algorithm uses different methods to get to the same result: identification of genuine VAP. If the two methods show no concordance, that is an important result.
Response to Reviewers:	thank you for the effort , still minor changes to make a figure only and suppress the table 1 (mandatory++) I suggest to start at the upper part of the figure with a flow diagram ---> in the middle an array with the number (%) of concordant diagnoses , and 2 other arrays: with on the left n (%)ECDC+ CDC - , on the right n (%) CDC-ECDC+ followed by the figure as is appeared in the R2 version. also : in the figure the legend "Sustained deterioration in oxygenation without systemic features of infection (No IVAC)" did not refer to any cases. could youy please check and delete it if there is no case with this definition? Thank you for your continued review. The requested changes have been incorporated into the resubmitted version. Thanks and best wishes.

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Ventilator-associated pneumonia (VAP) refers to inflammation of the lung parenchyma caused by an infectious agent acquired during invasive mechanical ventilation. The criteria used to define VAP are the subject of ongoing controversy and there remains no universally agreed international definition, at least in part accounting for the wide range of reported incidence [1]. Despite this, surveillance and public reporting for VAP is advocated by legislatures, accreditation agencies, and consumer organizations because it is viewed as a preventable complication with attributable morbidity and mortality [2].

In Europe the European Centre for Disease Control (ECDC) definitions are used [3]. Subjective chest x-ray interpretation and pulmonary symptoms are combined with objective systemic features of infection with or without supporting microbiological data (supplemental table 1). In contrast, the Centre for Disease Control (CDC) in the USA employs an algorithm designed to be entirely objective, developed and extensively evaluated with the aim of decreasing variation attributable to subjective interpretation [4]. It returns a hierarchical diagnosis culminating in probable VAP, triggered by a sustained deterioration in oxygenation after stability plus objective systemic features with mandatory supportive microbiology (supplemental table 2). We carried out a 12-month regional comparison of the surveillance definitions and posed the following research questions: what is the incidence of VAP when ascertained by ECDC or CDC definitions and what is the concordance between ECDC and CDC surveillance definitions?

We performed an observational study of all consecutive admissions to two large adult intensive care units in Edinburgh, UK. The data protection guardian approved the study; as a service evaluation ethics committee approval was not required. Two independent teams carried out each surveillance algorithm separately (more information available in the supplemental material). Concordant events between different algorithms were defined as those occurring not more than two calendar days either side of the day of diagnosis. Concordance was quantified using Cohen's kappa.

Between 1st June 2015 and 31st May 2016, we enrolled 1,240 sequential admissions who stayed longer than two calendar days. 713 (57.5%) were mechanically ventilated for more than two calendar days and formed our at-risk population for VAP as well as

providing the denominator for total ventilation days. Overall, the VAP rates per 1000 ventilation days (±95% confidence interval) were very similar (ECDC 5.4 (3.8-7.5), CDC 4.6 (3.1-6.6)). However, events diagnosed as VAP with the two surveillance definitions were almost completely discordant (Cohen's kappa 0.082 (95% CI: -0.034 to 0.191)). Reasons for discordance are shown in figure 1.

The recommended methods for VAP surveillance in Europe (ECDC) and the US (CDC) use different case definitions to identify VAP for surveillance to inform quality improvement and infection prevention. They report similar population-level rates of VAP but with almost no concordance among VAP events, predominantly due to either the absence of a sustained deterioration in oxygenation after stability or absence of relevant x-ray changes. These data suggest caution in comparing rates reported using different surveillance systems, and remind us these definitions should not be used to identify true VAP events in individual patients.

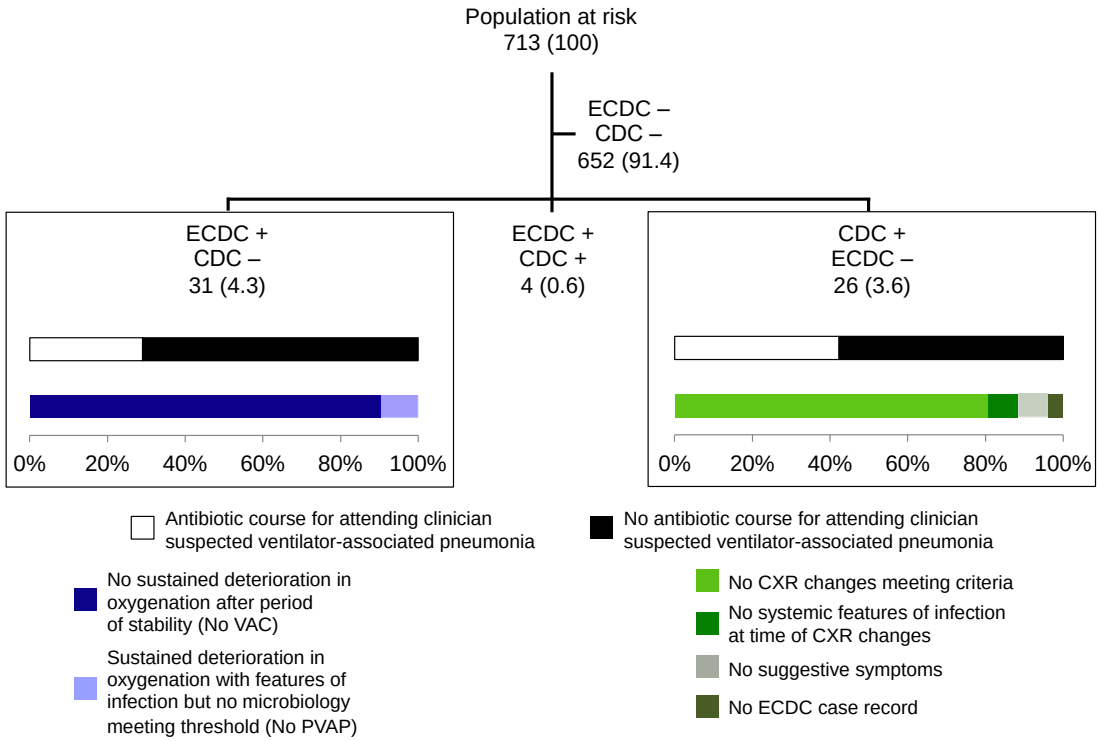

Figure 1 – Examination of discordance between surveillance definitions.
Flow chart illustrates each permutation of surveillance with ECDC and CDC systems with total number of patients (%). If a VAP event was triggered by one definition, the absence of a VAP event defined using the other definition within a five-day window centered on the trigger date was defined as discordance. Inset graphs: Top bar – proportion of events where the attending clinician initiated a course of antibiotics to

treat suspected VAP. Bottom bar – Reasons for not progressing to VAP via the alternate surveillance definition. Bars refer only to events within five-day window of VAP trigger date. VAC – ventilator-associated complication, PVAP – probable ventilator-associated pneumonia.

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